UNITED NATIONS DEVELOPMENT PROGRAMME

UNDP

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APPROVAL OF UNDP ASSISTANCE TO A PROJECT OF
INDIA

IPF:(1987-91) $152 120 000

(IND/91/011)- Engineering of structures for Mitigating Damage due to Cyclones

Date of approval by the AC:[1/]	18 December 1991
Expected duration:	Three years
Proposed executing agency:	Government
Government implementing agency:	Council of Scientific and Industrial Research (SCIR, Structural Engineering Research Centre, (SERC), Madras
Proposed UNDP contribution:	$1 500 000 Source of funds: IPF
Total UNDP budget:	$1 500 000

Project background

The Indian ocean is one of the major cyclone-prone regions of the world. During the period from 1945 to 1990, more than 220 cyclones hit India, especially the east coat. Those cyclones and their accompanying storms and floods have exacted heavy loss of life, and inflicted colossal damage to dwellings and buildings, and power transmission and communication systems. The estimated damage to various structures sustained by India from cyclones exceeds US$ 100 million yearly. Since cyclones cannot be prevented, the Government of India has launched a multi-disciplinary Natural Hazards Mitigation programme led by the Council of Scientific and Industrial Research, whose objectives include the seeking of technological solutions to mitigation of cyclone damage.

Under the programme, the Madras-based Structural Engineering Research Centre (SERC) has been given a mandate to contribute to the study, design, and dissemination of the structural engineering guidelines for eventual adoption in the Indian Codes of Practice to be followed by the building industry and civil construction enterprises. Specifically, the task ahead for the SERC is understanding of the loads created by high-velocity winds and of

[1/] This Fact Sheet reflects the status of the project/revision at the time it was approved by the Action Committee; modifications to the project/revision may have occurred subsequently.

the behaviour of various structures when subject to cyclonic forces, which is necessary to arrive at design elements essential to construct safe, reliable, and cost-effective structures.

Description of project

This three-year project is designed to assist the SERC to fulfill its mandate given under the Natural Hazards Mitigation Plan to provide specialized expertise in structural engineering required to draw up the design guidelines and codes aimed at reducing damage to buildings and other structures when subject to cyclonic forces.

Located as it is in cyclone-prone Madras, the SERC will be able to conduct "real-time" field experiments during cyclones by instrumenting existing structures such as residential and industrial buildings and electrical transmission line towers for on-site data collection. In tandem with the field research as well as its continual analysis using of the data on past cyclones, the SERC will conduct laboratory simulation analyses using a boundary layer wind tunnel to identify the critical factors that determine the parameters for the design of structures when subject to cyclonic forces.

When the design parameters are identified that could improve the construction of buildings and structures in a safe, reliable, and cost-effective manner in Indian conditions, a series of workshops will be organized for engineers, architects, and planners from both public and private sectors to review and elicit their feedback on the design guidelines and aids being prepared. The SERC will also convene a related high-level meeting targeted at policy makers from the Bureau of Indian Standards, the central and state public works departments, state housing boards, and the private sector to lay the ground for adoption, implementation and eventual enforcement of the guidelines once reflected in the Indian Codes of Practice .

Continual interaction will take place between the SERC and identified national partners through the latter's association with the SERC's Research Council, which is responsible for guiding and monitoring its R&D activities. Throughout the project the SERC will develop and expand its partnership with peer institutions located in developing and industrialized nations alike for joint R&D and other endeavours. An opportunity to establish a long-term twinning arrangement will be actively explored.

Inputs

UNDP will provide a total of 13 work-months of short-term consultancy in design and setting up of a wind tunnel, cyclone resistant structural engineering, dynamic response analysis, field experiments, and post-disaster survey and analysis; an in-depth evaluation; a total of 64 work-months of training through two study tours and 10 six-month fellowships in wind tunnel testing, dynamic analysis, instrumentation techniques, numerical analysis, and software develop-ment, and field investigations; and equipment for a wind tunnel laboratory and instrumentation for field experiments.

Financial data

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Personnel	213 900
Training	528 000
Equipment	750 000
Miscellaneous	8 100
Total	1 500 000